



HM Government

National contingency plan for invasive mosquitoes

Detection of incursions

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Contents

About Public Health England	2
Executive summary	5
Invasive mosquitoes as vectors of dengue fever, chikungunya, Zika and other viral infections	6
Hazard identification	7
Defining the level of risk for invasive mosquitoes	9
Aims of activities by risk level	10
Level 2	10
Surveillance, vector control and public or animal health actions for invasive mosquitoes by risk level	12
Level 0 - No invasive mosquitoes detected in England. Imported human and animal cases only	12
Level 1 - Invasive mosquitoes detected in England. Imported human or animal cases only (Current state)	15
Glossary	17
References	18
Annex 1. Local Plan for monitoring and response to invasive mosquitoes	20
Levels of risk for invasive mosquito species and indigenous exotic Vector Borne Disease (VBD) transmission	21
Aim and Objectives	22
Roles and Responsibilities	22
Level 0 - Surveillance	24
Level 1 - Response	26
Appendix 1: Local Area Surveillance	29

Executive summary

This document outlines proposed actions, as agreed across government bodies, in the event of detecting non-native invasive mosquito species in England. This is important because *Aedes albopictus* mosquitoes were found at different sites in Kent (every year from 2016 to 2019) and in London (2019), but currently without establishment or transmission of exotic viruses.

Although there are threats associated with other vectors, mosquito-borne infections are considered to be an immediate threat. This is based on invasive mosquito species recently found in England and the increasing reports of sporadic local transmission and outbreaks of vector-borne diseases (VBDs) such as dengue, Zika and chikungunya in Europe.

These are associated with the spread of invasive mosquitoes, and the threat of the transmission of viral pathogens to both humans and animals in Europe.

Modelling studies of likely spread or incursion of VBDs clearly show that the problem of emerging or re-emerging VBDs may intensify and spread to the UK soon.

In the absence of effective treatment or vaccines against these diseases, preparedness, early detection and prevention through vector control and public or animal health action are of vital importance to protect human and animal populations.

This document only covers suggested actions at local level after detecting invasive mosquitoes. A subsequent document will cover suggested actions after establishment is confirmed.

Invasive mosquitoes as vectors of dengue fever, chikungunya, Zika and other viral infections

Invasive mosquito species are defined by their ability to colonise new territories. Invasive mosquitoes have become widely established across Europe, with subsequent local transmission and outbreaks of dengue and chikungunya.

According to the European Centre for Disease Prevention and Control (ECDC) definition of invasive mosquito surveillance, detected means presence of mosquito eggs, larvae, or adult lifestages in a specific location, and established means they appear in the same location the following year.

Factors such as globalisation, the increasing volume of trade and travel, continuing urbanisation and environmental or climate change have contributed to the introduction and establishment of vectors previously confined to specific regions.

A considerable increase in the spread of invasive mosquito species has been observed within Europe since the late 1990s, with 5 different species of *Aedes* mosquitoes (*Aedes albopictus*, *Aedes aegypti*, *Aedes japonicus*, *Aedes atropalpus*, *Aedes koreicus*) now present or established in many countries.

In addition to their biting nuisance, they are potential vectors of exotic VBDs, such as dengue, chikungunya and Zika. To date, only *Ae. albopictus* and *Ae. aegypti* are considered important invasive vectors, however, field and laboratory studies demonstrate that all 5 species have the potential for transmitting viruses.

Ae. albopictus has now been reported in 28 different European countries as of March 2019. Since 2007, *Ae. albopictus* has been implicated in the transmission of chikungunya and dengue in Europe after established invasive mosquitoes acquired infection by blood-feeding from infected travellers. Chikungunya incidents included an outbreak in Italy in 2007 and a large outbreak in 2017, sporadic cases in France in 2010, and clusters in 2014 and 2017. Sporadic dengue cases were reported in Croatia in 2010, in France in 2010, 2014, 2015, 2018 and 2019, and in Spain in 2018 and 2019.

Local transmission of the Zika virus was reported from the first time in Europe in 2019, in France. *Ae. albopictus* expanded rapidly alongside road networks, particularly in France, and is now established in Paris and is expected to become established in northern France in the next few years. This can create potential new routes for introduction into the UK.

In September 2016 *Ae. albopictus* was reported for the first time in the UK from a single trap containing eggs, in southern England, and again in 2017 and 2018 from different sites in southern England. 3 incursions were detected in 2019. However, so far there is no evidence that it has become established.

In the UK, over the 5 years between 2012 to 2016 there were a total of 2,127 imported dengue cases (range 347-549 cases per year) and 588 imported chikungunya cases (range 15-295 cases per year) reported. Therefore, if *Ae. albopictus* becomes established in the UK, there is a risk of autochthonous transmission of these viruses. The ability of *Ae. albopictus* to adapt to new environments and overwinter, its predicted spread and establishment in Europe, and its confirmed involvement in pathogen transmission cycles makes the early detection, surveillance and control of this species very important.

Other arboviruses important to human health issues that have been isolated from field-collected *Ae. albopictus* worldwide, or for which laboratory transmission has been demonstrated, include Eastern equine encephalitis virus, Japanese encephalitis virus, La Crosse virus and Venezuelan equine encephalitis virus.

Ae. aegypti is another important invasive mosquito species that could affect public health in Europe. Globally, it is the main vector of dengue, Zika and yellow fever, and also a vector for the chikungunya virus.

It disappeared from Europe in the mid-20th century, but recently reappeared in Madeira and around the Black Sea in southern Russia, Abkhazia, Georgia and Turkey. In 2012, *Ae. aegypti* was implicated in a large outbreak of dengue in Madeira involving more than 2,000 locally transmitted cases.

This species can be imported from Madeira to mainland Europe, spreading to its former range in southern Europe, where it was implicated in historical large outbreaks of dengue and yellow fever. So far, this species has not adapted to a temperate climate and is not expected to survive in Britain, although adaptation can be rapid in mosquitoes so early detection and prompt implementation of control measures is crucial.

Hazard identification

Table 1 offers details of exotic mosquito-borne infections of public or animal health importance for invasive mosquito species. The unprecedented change in status of VBDs in Europe in recent decades is mainly due to a change in vector distribution underpinned by increased globalisation and changes in climate and the environment. This is likely to continue. Therefore, VBD risk in the UK is likely to increase.

The surveillance and control strategies described in this plan can be applied to other new or re-emerging pathogens and their mosquito vector species, provided that they are carefully customised and adapted to the particular context.

Table 1 Viral infections of public or animal health importance posing a potential threat to the UK and their non-native mosquito vector species

Pathogen	Important mosquito vector	Invasive vector	Current distribution	Disease in animals or humans	Animal reservoir
Dengue virus	<i>Ae. aegypti</i> , <i>Ae. albopictus</i>	Invasive	Endemic in Africa, Americas, Asia and Caribbean. Frequently imported into Europe. Outbreak on Madeira in 2012; sporadic local transmission in Croatia (2010); in France (2010, 2014, 2015, 2018 and 2019); in Spain (2018 and 2019).	Humans	None
Chikungunya virus	<i>Ae. aegypti</i> , <i>Ae. albopictus</i>	Invasive	Endemic in Africa and Asia. Frequently imported into Europe. Outbreak in Italy in 2007; sporadic local transmission in France (2010, 2014 and 2017); and in Italy in 2017.	Humans	None
Yellow fever virus	<i>Ae. aegypti</i>	Invasive	Endemic in Africa and South America. Occasionally imported into Europe.	Humans	Non-human primates
Zika virus	<i>Ae. aegypti</i> (<i>Ae. albopictus</i>)	Invasive	Epidemic in Africa, Americas, Caribbean and Pacific Islands. Often imported to Europe. First local transmission in Europe in 2019, in France.	Humans	Non-human primates
Japanese encephalitis virus	<i>Culex</i> spp., <i>Ae. albopictus</i> , <i>Ae. koreicus</i>	Invasive	Endemic in Asia.	Humans Equines Pigs	Wild birds, pigs
Eastern equine encephalitis virus	<i>Culex</i> spp., <i>Ae. albopictus</i>	Invasive	Endemic in the Americas.	Humans Equines	Wild birds
Western equine encephalitis virus	<i>Culex</i> spp., <i>Ae. triseriatus</i>	Invasive	Endemic in western part of North America.	Humans Equines	Wild birds
Venezuelan equine encephalitis virus	<i>Culex</i> spp., <i>Ae. albopictus</i>	Invasive	Endemic in the Americas.	Humans Equines	Rodents, horses, wild birds

Defining the level of risk for invasive mosquitoes

The objective of a risk-based response using entomological and epidemiological surveillance data is to implement timely interventions appropriate to the level of risk in a local or widespread geographical area. Effective action depends on interpreting the best available vector, animal and human surveillance data and starting prompt and aggressive interventions when necessary. Actions should depend on whether the vector or the exotic VBD are detected, whether locally transmitted human or animal cases have been identified and the extent of the spread.

The levels of risk and the resulting actions should depend on whether invasive mosquitoes, or an exotic viral infection in a person or in an animal which has not travelled, have been reported. If the initiating factor is a report of human or animal cases of exotic mosquito-borne infections, and after thorough investigations no other reason for the infection is detected, transmission from undetected invasive mosquito species will be assumed. Response would then start at Level 3 (Table 2). Response actions for levels 2 to 4 will be detailed in a subsequent plan.

Table 2 Levels of risk for invasive mosquito species and indigenous exotic VBD transmission (Levels 2 to 4 shown for information only.)

Level 0	No invasive mosquitoes detected ¹ in England. Imported human or animal cases only.
Level 1	Invasive mosquitoes detected in an area ² in England. Imported human or animal cases only.
Level 2	Invasive mosquitoes established in an area in England. Imported human or / animal cases only.
Level 3	Invasive mosquitoes established in an area a) and 1 or more cases of confirmed autochthonous transmission of human or animal exotic mosquito-borne infection in that area b) or 1 or more cases of confirmed autochthonous transmission of human or animal exotic mosquito-borne infection in 1 area
Level 4	Invasive mosquitoes widely established in England, and geographically spread sporadic autochthonous transmission and outbreaks of human or animal cases of an exotic mosquito-borne infection.

¹ Detected means presence of eggs, larvae or adult lifestages in a location, and established means they appear in the same location the next year

² Area can be either a local authority or a LRF depending on geography and local arrangements

A Level 1 area will become Level 0 following detection and control, if no further eggs, larvae or mosquitoes are detected by the end of the following transmission season.

Aims of activities by risk level

Level 0

The aim of entomological surveillance is to confirm, primarily at ports of entry and alongside main highway routes, that invasive mosquitoes are not present in the UK.

Epidemiological surveillance in humans determines the countries where imported cases of exotic viral infections acquired their infections.

For epidemiological surveillance in animals, the aim is to use horizon scanning and passive surveillance for notifiable diseases or syndromic surveillance through surveillance scanning programmes. The findings from ongoing horizon scanning for emerging threats to both animal and public health are reviewed at monthly meetings of the Veterinary Risk Group (APHA-led) and the cross-government Human and Animal Infections and Risk Surveillance (HAIRS) group. Any passive surveillance which identifies cases in imported animals will be communicated to the public health authorities in case any action is required.

Level 1 (Current state)

The aim of entomological surveillance is to investigate the first detection of an invasive mosquito, to define its distribution and inform the control strategy to ensure that an invasive mosquito species does not establish in the UK.

The aim of human and animal epidemiological surveillance is as per Level 0.

A Local Plan Template for organisations to complete for local monitoring and surveillance at Level 0, and response to detection of adult mosquitoes, eggs and larvae at Level 1 is at [Annex 1](#).

The following information on levels 2 to 4 is for awareness only, and will be addressed fully in a subsequent plan.

Level 2

The aim of entomological surveillance is to determine the distribution of invasive mosquitoes in the UK. The intervention aims to eradicate the invasive mosquito species, identify where populations may be established and to minimise the risk of local transmission.

The aim of epidemiological surveillance is to determine the risk of onward transmission from imported human and animal cases to the local population, based on the geographical distribution of invasive mosquitoes around the location of imported cases. Public health actions aim to prevent onward transmission of VBD by limiting exposure of viraemic travel-related cases to local invasive mosquito populations.

Animal health actions will depend on whether the animal represents a dead-end host, a reservoir host or if clinical signs are observed which may cause welfare issues. For dead-end hosts with no welfare issues, no further action is required. If animals pose a risk as a reservoir host and are recently imported and detected as part of post import tests, the Trade in Animals and Related Products Regulation 2011 (TARP) (which is devolved legislation, aligned across the administrations) may be invoked to prevent further spread of disease.

If an infected wild bird is detected, some additional wild bird surveillance may be implemented, but it may not be of significant benefit. Vaccination for diseases, such as Equine Encephalitides (EEs), may be considered for animals at risk.

Level 3

The aim of entomological surveillance is similar to that of Level 2, with an additional goal of reducing exposure of humans and animals to invasive mosquitoes.

The aim of epidemiological surveillance is to determine the level of autochthonous spread in the local population. Public health actions aim to interrupt local transmission of VBD by identifying and isolating potentially viraemic cases (which could number 100s of cases per year) and reducing exposure of humans and animals to infectious invasive mosquito vectors.

For animals, action again depends on whether their role is as a dead end host, a reservoir or at risk of developing disease. The Zoonoses Monitoring (England) Regulations 2007 (devolved but aligned in Scotland and Wales) and the Animal Health Act 1981 may both be invoked to allow sampling, testing, treatment or control of livestock or other captive animals.

The intensity of surveillance, vector control activities and public and animal health action will depend on whether 1 autochthonous case is identified or whether an outbreak (2 or more cases) has been declared. Vaccination for diseases, such as EEs, might be considered for animals at risk.

Level 4

Surveillance, vector control and public or animal health actions are same as that of Level 3, but will be required over a wider geographical area and require national cross-government coordination and response.

Surveillance, vector control and public or animal health actions for invasive mosquitoes by risk level

Level 0 - No invasive mosquitoes detected in England. Imported human and animal cases only

Entomological surveillance:

Monitor sea and air ports of entry for mosquitoes

One of the main routes of entry for invasive mosquitoes might be through air and sea transportation. We suggest the following activities:

Traps to be run at all major sea and air ports with international links with mosquito endemic areas and disease outbreaks. Port health authorities and local authorities can help with accessing sites. Surveillance can be coordinated by PHE Entomology but should be conducted by Port Health Officers.

Port mosquito surveillance should include at least 5 Gravid Aedes traps (GAT), checked fortnightly, and 1 BG Sentinel (particularly at Border Inspection Posts), checked weekly. Samples should be submitted to PHE for identification. Mosquito surveillance at ports can be restricted from April to November³, however during a global disease outbreak they should be operated all year-round, according to the current engagement between Port Health Officers and PHE.

Conduct surveillance alongside highway networks linked to ferry ports and Eurotunnel and at Eurostar stations and terminals

³ Surveillance targeting airports and ports is conducted from April to November. Surveillance targeting traffic on highways is conducted from June to October.

Recent northward spread in France highlights the ferry and rail routes as a potential route for imported mosquitoes. To detect mosquitoes entering the country through the main ferry ports, traps are run at main highway service stations (GAT, ovitraps, BG Sentinel) and Eurostar stations (GAT). Traps to be run June to October, checked every 2 weeks. Coordinated by PHE Entomology and conducted by local authority and PHE

Conduct nationwide passive surveillance with public and environmental health

In addition to targeted surveillance for invasive mosquitoes (as below), passive surveillance from reports by the public and environmental health officers can assist in detecting populations of invasive mosquitoes.

Maintain “mosquito watch” programme between PHE entomology and the Chartered Institute of Environmental Health (CIEH) providing a portal for environmental health officers to submit samples to PHE and partners for identification.

Maintain “mosquito recording scheme” coordinated through GOV.UK website by PHE entomology. Possibility of creating a web portal for specific reporting should be considered, such as the use of smart phone apps.

Mosquito identification currently depends on morphological appearance. If genetic analysis for mosquito speciation or confirmation is required, this will have to be undertaken by external bodies.

Report the detection of invasive mosquitoes

Reporting of the detection of invasive mosquitoes and results of negative findings from surveillance by local authorities, academic units or PHE entomology needs to be done as soon as practicably possible, to allow the appropriate notifications and elevation to Level 1.

Any record of an invasive mosquito to be reported to PHE entomology.

A Local Plan Template for organisations to complete for local monitoring and surveillance at Level 0 is at [Annex 1](#).

Human surveillance

Travel-related cases of exotic infections are diagnosed at PHE Rare and Imported Pathogens Laboratory (RIPL). Clinicians are requested to submit samples with a request form providing clinical and travel history details for suspected cases. Data cleaning, analysis and reporting are undertaken by the PHE Travel Health Section.

The PHE Emerging Infections and Zoonoses Section scans many sources using a formal horizon scanning system, for emerging infections news that may be of relevance to public health, including VBD incidents. The section also works with colleagues involved with blood and tissue safety.

Animal surveillance

Imported animals (horses, livestock, pets) may be checked and tested as part of import and intra-community trade controls (the Vet Checks Directive, 90/425/EEC and 91/496/EEC).

Passive surveillance of livestock and horses for clinical signs associated with any notifiable exotic disease is in place. In addition, a syndromic surveillance system for EEs is in place where the owner wishes to rule out a notifiable disease.

Export testing – a limited level of testing for certain diseases, such as EEs. This is not required for diseases such as Rift Valley fever at present, but if cases occurred in the EU, it is likely to be requested.

Vector control

None (no invasive mosquitoes detected in England)

Public health actions

Travel health information available for overseas travellers, including country-specific advice and mosquito bite avoidance advice

The NHS Blood and Transplant (NHSBT) Service have up-to-date guidelines regarding blood donation and overseas travel. For example, travellers to chikungunya virus risk areas must wait 4 weeks after return before donating. If they have displayed any symptoms of chikungunya virus infection, they must wait 6 months before donating

Continue to maintain available guidance for the public on mosquito control on the GOV.UK website and guidance for Environmental Health Officers (EHOs) on the CIEH website. The public and EHOs will only be alerted to target mosquito control once invasive mosquitoes have been detected

Animal health actions

The Trade in Animals and Related Products Regulation (2011), the Zoonoses Monitoring England Regulations 2007 (both devolved in Scotland and Wales, but aligned) and the Animal Health Act 1981 provide the legal vires to humanely destroy any animals which represent a risk to human or animal health.

Level 1 - Invasive mosquitoes detected in England. Imported human or animal cases only (Current state)

A multi-agency Local Incident Response Group will be set up by the local PHE Centre to co-ordinate local actions.

This will undertake the command, control and co-ordination functions of a Tactical Co-ordinating Group that would be set up for a police-led incident.

A cross-government Vector Control Management Group (VCMG) might be required to support the local response and consider national support requirements.

Entomological surveillance

An investigation is essential to determine if the mosquito is from an established population, what its geographic extent, its likely source and possibly linked foci and to start control to prevent establishment or spread.

Enhanced mosquito surveillance

To establish the extent of distribution and mosquito density numbers, there will be a joint investigation by the PHE local HPT, PHE entomology and local authority Environmental Health teams. This will be led by the HPT as it will be treated as a local incident. The HPT will convene a teleconference with PHE entomology and local authority Environmental Health teams to agree the response. The local authority will organise the control, with technical advice from PHE entomology. A Local Plan Template is included in [Annex 1](#).

The mosquito surveillance strategy will be in accordance with the ECDC guidelines of invasive mosquito surveillance, utilising a range of traps for adult mosquitoes, ovitraps and larval sampling.

Human surveillance:

As per Level 0.

Animal surveillance

As per Level 0.

Vector control

If more mosquitoes are found through surveillance activities, we suggest starting the Management and Invasive Species of Mosquitoes control plan:

<http://www.urbanpestsbook.com/downloads/>

Coordination and control will be conducted by the Local Incident Response Group, including:

- insecticidal control of larvae, including identification of sites; mobilisation and procurement of larvicides; agreement of use of larvicides
- adulticidal control
- public engagement in minimising habitats and source reduction
(Refer to PHE poster on mosquito control around the home:
<https://www.gov.uk/government/publications/mosquito-control>)
- monitoring of the effect of insecticidal control and reduction in established foci
- subsequent surveillance to confirm efficacy of control
- coordination between PHE entomology and local authority and national team

If the Local Authority does not have the capacity or ability to respond in a timely manner, this will urgently be discussed in the VCMG.

A Local Plan Template for organisations to complete for local response to detection of mosquitoes, eggs and larvae at Level 1 is at [Annex 1](#).

Public health actions

As per Level 0.

Animal health actions

As per Level 0.

Glossary

BG Sentinel	Biogents' Professional Mosquito Trap
CCS	Cabinet Office Civil Contingency Secretariat
CIEH	Chartered Institute of Environmental Health
DHSC	Department of Health and Social Care
ECDC	European Centre for Disease Prevention and Control
EE	Equine Encephalitides
EHO	Environmental Health Officer
GAT	Gravid Aedes Trap
HAIRS	Human and Animal Infections and Risk Surveillance
HPT	Health Protection Team
ICT	Incident Control Team
LA	Local Authority
LRF	Local Resilience Forum
MHCLG	Ministry of Housing, Communities & Local Government
NEEG	National Emergency Epidemiology Group
NEG	National Expert Group
NHSBT	NHS Blood and Transplant Service
NIERP	National Incident and Emergency Response Plan
PHE	Public Health England
RIPL	Rare and Imported Pathogens Laboratory
TARP	Trade in Animals and Related Products Regulation 2011
UK	United Kingdom
VBD	Vector-borne disease
VCMG	Vector Control Management Group

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<http://www.urbanpestsbook.com/downloads/>

Annex 1. Local Plan for monitoring and response to invasive mosquitoes

For inclusion in Local Resilience Forum (LRF) or Local Health Resilience Partnership Communicable Diseases Plan or other appropriate plans.

(For Response Actions, go to [Section 1.37](#))

Introduction

- 1.1 This template plan has been developed to support local arrangements for monitoring and surveillance of invasive mosquitoes (Level 0 – see table in section 3 below) and respond if mosquito eggs and larvae are identified in a location in England (Level 1).
- 1.2 If mosquitoes become established (Levels 2-4), local actions at Levels 0 and 1 will continue and additional actions will be required as defined in the Cross-Government National Contingency Plan Part 2 (not yet published) and are likely to require national co-ordination through a cross-government VCMG.
- 1.3 Information in this template plan is based on:
 - Cross-Government National Contingency Plan
 - Management of Invasive Species of Mosquitoes (CIEH)/PHE)
<http://www.urbanpestsbook.com/downloads>
- 1.4 Invasive mosquitoes can be disease vectors of exotic infections that are not typical to the UK.
- 1.5 They are able to transmit dengue fever, chikungunya, Zika virus and other viral infections.
- 1.6 Invasive mosquito species are able to colonise new territories. They have become widely established across Europe and by local transmission they can cause serious outbreaks of viral diseases.
- 1.7 A considerable increase in the spread of invasive mosquito species has been observed in Europe since the late 1990s. This is due to globalisation, the increasing volume of trade and travel, continuing urbanisation and environmental or climate change.

- 1.8 Invasive mosquitoes cannot fly far, but can move using a carrier, for instance vehicles and goods.
- 1.9 *Ae. albopictus* and *Ae. aegypti* are considered the most important invasive vectors. *Ae. aegypti*, which is widely known as the main vector of Zika infection, has not adapted to a temperate climate and is not expected to survive in a British climate.
- 1.10 *Ae. albopictus* has now been reported in 28 different European countries. This species continues to expand rapidly alongside road networks, particularly through France, and has become established in northern France (including Paris), creating potential new routes for introduction into the UK.
- 1.11 If an invasive mosquito is found, urgent control measures should be undertaken, otherwise there is a risk that *Ae. albopictus* could become established.
- 1.12 Once established, the mosquitoes are hard to get rid of because even though the larvae and adult mosquitoes may die in colder weather, their eggs could survive and reactivate next spring (establishment).
- 1.13 If invasive mosquitoes are found, increased surveillance must be carried out to determine the distribution of invasive mosquitoes.

Levels of risk for invasive mosquito species and indigenous exotic Vector Borne Disease (VBD) transmission

(Note that information on levels 2 to 4 are included here for awareness only)

Level 0	No invasive mosquitoes detected* in England. Imported human or animal vector borne disease cases only.
Level 1	Invasive mosquitoes detected* in an area in England. Imported human or animal cases only.
Level 2	Invasive mosquitoes established* in an area in England. Imported human or animal cases only.
Level 3	Invasive mosquitoes established* in an area in England, and 1 or more cases of confirmed autochthonous transmission of human or animal exotic mosquito-borne infection in 1 or more foci in a limited region.
Level 4	Invasive mosquitoes widely established* in England, and geographically spread sporadic autochthonous transmission and outbreaks of human or animal cases of an exotic mosquito-borne infection.

*Detected means presence of adults, eggs and larvae in a specific location, and established means they appear in the same location the next year. This is in accordance with ECDC definitions of invasive mosquito surveillance.

Aim and Objectives

1.14 Aim: to provide a framework for surveillance and response to invasive mosquitoes in the area⁴ at Levels 0 and 1

1.15 Objectives:

- outline a monitoring and surveillance programme for invasive mosquitoes within the area at Level 0
- describe the roles and responsibilities of responding agencies following the identification of invasive mosquitoes in the area (Level 1)

Roles and Responsibilities

1.16 Public Health England Medical Entomology group:

- maintain “mosquito watch” programme with the CIEH providing a portal for Environmental Health Officers to submit samples to PHE and partners for identification
- maintain “mosquito recording scheme” coordinated through GOV.UK website
- supports an extensive network of traps in conjunction with local authorities. For a latest list of surveillance sites or to discuss setting up new surveillance sites please contact mosquito@phe.gov.uk
- co-ordinate the placement and monitoring of mosquito traps in conjunction with other organisations, such as Port Health Authorities and local site owners.
- Analyse submitted samples
- notify Public Health England (National) regarding any identification of a mosquito risk
- at Level 1, undertake joint investigation with local health protection teams and local authority environmental health teams

1.17 Public Health England Rare and Imported Pathogens Laboratory (RIPL):

- diagnose travel-related cases of exotic infections

⁴ Area can be either a local authority or a LRF depending on geography and local arrangements

1.18 Public Health England Emerging Infections and Zoonoses Section:

- scans various sources using a formal horizon scanning system, for emerging infections news that may be of relevance to public health including VBD incidents and also work with colleagues involved with blood and tissue safety

1.19 Public Health England (National)

1.19.1.1 On notification of a mosquito risk:

- notify Department of Health and Social Care, and Civil Contingencies Secretariat
- consider convening a VCMG

1.20 Public Health England Centre Health Protection Team (HPT)

- any record of an invasive mosquito to be reported to PHE entomology
- on notification of a mosquito risk in the PHE Centre area, notify relevant organisations and convene a Local Incident Response Group. (This will undertake the command, control and co-ordination functions of a Tactical Co-ordinating Group that would be set up for a Police led incident.)
- consider the requirement to establish a PHE Centre Incident Control Team (ICT) to coordinate the Health Protection Team response.

1.21 District or Borough Councils, Unitary Authorities and Port Health Authorities participating in surveillance schemes:

- work with Public Health England (Entomology) to identify locations for traps, types of traps to be used and agree the process for monitoring and sending samples – See [Appendix 1](#)
- on notification of a mosquito risk in the council or authority area, participate in Local Incident Response Group convened by Public Health England Centre Health Protection Team (HPT)
- co-ordinate the operational response to an identified mosquito risk in their area through pest control or contractors
- gain entry to land to offer treatment (local authorities)
- consider communications to the public in partnership with other local authorities and PHE to inform and reassure the public

1.22 County Councils - Public Health

- participate in Local Incident Response Group

- consider communications to the public in partnership with other local authorities and PHE to inform and reassure the public

Level 0 - Surveillance

Entomological surveillance

1.23 Monitor sea and air ports of entry for mosquitoes

1.24 One of the main routes of entry for invasive mosquitoes may be through sea and air transportation. Therefore the following activities should take place:

- traps to be run at all major sea and air ports with international links with mosquito endemic areas and disease outbreaks
- port health authorities and local authorities can help with accessing sites
- surveillance to be coordinated by PHE Entomology but conducted by Port Health Officers
- port mosquito surveillance should include ovitraps, Gravid Aedes traps (GAT), or BG Sentinel traps in consultation with PHE. Samples submitted to PHE Entomology for identification
- mosquito surveillance at ports can be restricted to the period between May and November, however during a global mosquito-borne disease outbreak of public health concern then they should be operated all year-round

1.25 Conduct surveillance alongside motorway networks linked to ferry ports and Eurotunnel and at Eurostar stations and terminals:

- recent northward spread in France highlights that ferry and rail routes could be a route for imported mosquitoes
- to detect mosquitoes entering the country through the main ferry ports run traps at service stations on roads near ferry ports (for example GAT, ovitraps, BG Sentinel) from June to October
- coordinated by PHE Entomology and conducted by local authorities and PHE Centres that have volunteered to do so
- details of current surveillance locations and potential additional locations are at [Appendix 1](#)

1.26 Conduct nationwide passive surveillance with public and environmental health agencies

1.27 In addition to targeted surveillance for invasive mosquitoes, passive surveillance from reports by the public and environmental health officers can assist in detecting populations of invasive mosquitoes.

- 1.28 Maintain “mosquito watch” programme between PHE entomology and CIEH providing a portal for environmental health officers to submit samples to PHE and partners for identification.
- 1.29 Maintain “mosquito recording scheme” coordinated through [GOV.UK](#) website by PHE entomology. Possibility of creating a web portal for specific reporting should be considered, such as the use of smart phone apps.
- 1.30 Mosquito identification currently depends on morphological appearance. If genetic analysis for mosquito speciation or confirmation is required, this will have to be undertaken by external bodies.

Human surveillance

- 1.31 Travel-related cases of exotic infections are diagnosed at PHE RIPL. Clinicians are requested to submit samples with a request form providing clinical and travel history details for suspected cases. Data cleaning, analysis and reporting are undertaken by the PHE Travel Health Section.
- 1.32 The PHE Emerging Infections and Zoonoses Section scans various sources using a formal horizon scanning system, for emerging infections news that may be of relevance to public health including VBD incidents and they also work with colleagues involved with blood and tissue safety.

Animal surveillance

- 1.33 Imported animals (horses, livestock, pets) may be checked and tested as part of import and intra-community trade controls (the Vet Checks Directive, 90/425/EEC and 91/496/EEC). Any request for testing imported animals will be coordinated by APHA’s Carlisle Centre for International Trade, who will use local APHA officers and staff to attend and take samples.
- 1.34 Passive surveillance of livestock and horses for clinical signs associated with any notifiable exotic disease is in place. Suspicion of disease should be raised through the Defra Rural Helpline 03000 200 301. Further information on contacting APHA in Wales and Scotland can be found on the [APHA contact pages](#) on GOV.UK. In addition, a syndromic surveillance system for Equine Encephalitides (EEs) is in place where the owner wishes to rule out a notifiable disease and again, this should be raised through the helpline numbers as for suspicions.
- 1.35 Export testing – limited level of testing for certain diseases, such as EEs. This is not required for diseases such as Rift Valley fever at present, but if cases occurred in the EU it is likely to be requested.

Vector control

1.36 None. No invasive mosquitoes detected in England.

Level 1 - Response

1.37 A response will be activated upon the positive identification of an invasive mosquito species by PHE.

Entomological surveillance

1.38 Investigation by PHE Entomology, PHE Health Protection Team, Local Authority or Port Health Authority to determine:

- whether the findings are eggs, larvae or adults
- if from an established population or an individual occurrence
- its geographic extent
- its likely source and possible linked foci
- means of control to prevent establishment or spread

1.39 Enhanced mosquito surveillance around known foci to establish extent of distribution and mosquito density:

- joint investigation by PHE Entomology, PHE Health Protection Team and Local Authority or Port Health Authority Environmental Health Team or Contractors
- mosquito surveillance strategy will be in accordance with the ECDC guidelines for the surveillance of invasive mosquitoes in Europe (<https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/TER-Mosquito-surveillance-guidelines.pdf>) utilising a range of traps for adult mosquitoes, ovitraps and larval sampling.
- GIS or other mapping to be used with 300m cordon drawn around the site

Human surveillance

As per Level 0.

Animal surveillance

As per Level 0

Vector control

- 1.40 If further mosquitoes found during the surveillance activities outlined above, initiate **Management of Invasive Species of Mosquitoes control plan**.
- 1.41 Activities will be coordinated by the Local Incident Response Group supported where required by the VCMG.
- 1.42 Local authority or Port Health Authority Environmental Health teams or Contractors initiate control measures – Refer to Management of Invasive Species of Mosquitoes (CIEH/PHE) <http://www.urbanpestsbook.com/downloads>
- 1.42.1 Identify affected land or premises ownership and occupation and arrange urgent site visits.
- 1.42.2 For residential areas consider expanding the surveillance zone to a defined boundary, such as a road. This is to reduce concerns that residents may have if excluded from the surveillance area but close neighbours are included.
- 1.42.3 Use GIS or other mapping with 300m cordon drawn around the site.
- 1.42.3.1 Agree control measures:
- engage local residents and businesses to minimise habitats and source reduction
 - litter removal
 - drain and gutter clearance
 - remove other potential aquatic habitats
 - provide PHE poster on mosquito control around the home:
<https://www.gov.uk/government/publications/mosquito-control>
 - if necessary carry out work above or contract out
 - if it is difficult to access properties and apply regulatory powers, consider extending the period of surveillance and the area of surveillance
 - use of larvicides and adulticides and arrangements for application
- 1.42.4 Monitor effect of insecticidal control and reduction in established foci.
- 1.42.5 Determine subsequent surveillance to confirm efficiency of control.
- 1.43 If the local Authority or port health authority does not have the capacity or ability to respond in a timely manner, this will urgently be discussed in the VCMG.

Warning and informing

1.44 The established Local Incident Response Group will manage communications.

1.45 Engagement of affected land owners may have to be in person with supporting information such as a leaflet explaining the risk and treatment and any further actions.

1.46 We suggest sending leaflets or letters to nearby properties that aren't affected, and not part of a treatment programme, is also important to assure the public of safety.

1.47 Local authorities may wish to create a portfolio of correspondence templates to help speeding up responses. We suggest:

- part 2A orders
- warrant of entry
- letter to residents from DPHPHE/councils
- press release template
- mosquito factsheets

Appendix 1: Local Area Surveillance

To be used for recording details of local surveillance sites.

1. Current locations of monitoring traps

- contact PHE for latest list of surveillance sites or to discuss setting up new surveillance sites: mosquito@phe.gov.uk
- see [Section 3](#) for additional possible locations

Location	Details	Responsible authority

2. Surveillance and Response Considerations

Refer to: Management of Invasive Species of Mosquitoes (CIEH/PHE).

<http://www.urbanpestsbook.com/downloads>

Information about the sites chosen for surveillance should be included as an Appendix to this section and made available on Resilience Direct.

This information should include:

- name of surveillance location
- surveillance period
- traps
- sampling frequency
- organisation(s) responsible for checking traps
- site specific location for staff collecting samples – for instance signing in requirements, site specific personal protective clothing (for instance high-vis clothing), torch, trowel
- any additional information or guidance (for instance Public Health England Instructions for ovitrap surveillance)
- details to post samples to
- site maps showing:
 - 300m enhanced surveillance area around site
 - types of traps and locations
 - target larvae and adults
 - stand-alone or electrical powered
 - details of land or premises ownership and occupation (for example industrial, residential, agricultural, sensitive areas)

- for residential areas within 300m surveillance area, consider expanding the surveillance zone to a defined boundary, for example, a road. This is to reduce concerns that residents might have when they are excluded from the surveillance area, but close neighbours are included
- details of any legal powers of entry that might be required and when they can be used
- responsibilities for and frequency of checking traps
- details of pest control contractors with experience of mosquito control
- details of any mutual aid arrangements
- where stocks of larvicide are located and how this would be used if not using contractors or mutual aid

3. Potential locations for monitoring traps

Ports and Harbours (cross channel or freight) and road links

Port or harbour	Type of commerce	Local authority and neighboring local authorities	Truck stops/service stations*
Poole (as an example)	Ferry port, commercial, fishing	Poole (unitary) Neighboring local authorities: Bournemouth (unitary) East Dorset (district) Purbeck (district) Dorset (county)	

*Choose these based on the number of trucks they support, and their proximity to cross-channel services.

Other ports and harbours

Local authority area	Name of port or harbour

Commercial international airports

Airport	Local authority

Other airports

Local authority area	Details

Other locations

Local authority area	Details